

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
 TEST -3 EXAMINATION- 2024  
 B.Tech-I Semester (BT/BI)

COURSE CODE (CREDITS): 24B11MA112 (4)

MAX. MARKS: 35

COURSE NAME: MATHEMATICS FOR LIFE SCIENCES-I

COURSE INSTRUCTORS: MDS

MAX. TIME: 2 Hours

**Note:** (a) All questions are compulsory.

(b) The candidate is allowed to make suitable numeric assumptions wherever required

Q.No	Question	CO	Marks
Q1	For what values of $\lambda$ and $\mu$ the system of linear equation has $x + y + z = 6$ $x + 2y + 5z = 10$ $2x + 3y + \lambda z = \mu$ I. a unique solution II. No solution III. Infinite many solution	CO-1	4
Q2	(a) Expand $\log(1 + e^x)$ by Taylor's series about the point $x = 0$ , up to third degree terms. (b) Find $\frac{dy}{dx}$ , if $y = \frac{2-3\cos x}{\sin x} + e^{(5x-9)} \log(x^2 + 7x - 5)$ .	CO-2	3+3
Q3	(a) If $\frac{(1+i)^2}{(2-i)} = x + iy$ , the value of $x + y$ . (b) Evaluate $(i^{37} + \frac{1}{i^{67}})^9$	CO-3	2.5+2.5
Q4	If $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} + 3\hat{j} - 5\hat{k}$ , then find $\vec{a} \times \vec{b}$ . Verify that $\vec{a}$ and $\vec{a} \times \vec{b}$ are perpendicular to each other.	CO-4	4
Q5.	Find the shortest distance between the following pair of lines whose vector equations are $\vec{r} = 3\hat{i} + 8\hat{j} + 3\hat{k} + \lambda(3\hat{i} - \hat{j} + \hat{k})$ and $\vec{r} = -3\hat{i} - 7\hat{j} + 6\hat{k} + \mu(-3\hat{i} + 2\hat{j} + 4\hat{k})$ .	CO-4	5
Q6.	Evaluate $\int_{-3}^3  x + 1  dx$	CO-5	3
Q7.	(a) Evaluate $\int \left( \frac{\cos(\tan^{-1} x)}{1 + x^2} + \left( \sqrt{x} - \frac{1}{\sqrt{x}} \right)^2 \right) dx$ (b) Using partial fraction technique solve $\int \frac{x^2}{(x-1)(x^2+1)} dx$	CO-5	4+4